computer and a "Setun'" machine has now been added. Computer centers were established at the Gosplan SSSR (State Planning Commission USSR) and the Gosplan RSFSR (State Planning Commission RSFSR) and mathematics groups at the sovnarkhozes. A report on functional analysis methods is given next, Chebyshev and L. V. Kantorovich being mentioned. L. V. Kantorovich and his pupils G. P. Akilov and I. P. Mysovskikh are mentioned, as well as the papers by S. M. Lozinskiy, A. F. Filippov, and Chaplygin. Papers by A. G. Vitushkin, N. S. Bakhvalov, A. N. Kolmogorov, and N. M. Korobov on algorithms are mentioned. A number of collectives under the direction of A. A. Lyapunov, M. R. Shura-Bura, and N. A. Krynitskiy are working in the field of computer mathematics and mathematical logic. Arithmetical-logical models are used at present which are realized on mathematical machines. It is underlined that G. M. Adel'son-Vel'skiy discovered observation errors when simulating some decomposition processes of mesons, which are studied at the Institut teoreticheskoy i eksperimental'noy fiziki (Institute of Theoretical and Experimental Physics), by means of the M-2 (M-2) computer. The papers by V. S. Vladimirov are mentioned in connection with the probability methods of the type "Monte Carlo". Finally, it is stated that the development of modern computer mathematics is closely

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connected with various fields of mathematical sciences. By utilizing their results, computer mathematics will influence the future progress of mathematics as a whole.

SOBOLEV, S. L. and LYUSTERNIK, L. A.

"Modern Problems in the Theory of Calculations"

presented at the All-Union Conference on Computational Mathematics and Computational Techniques, Moscow, 16-28 November 1961

So: Problemy kibernetiki, Issue 5, 1961, pp 289-294

SOBOLEW, S. L. (Nowosybirsk)

Address delivered at Stefan Banach's commemorative ceremony. Ricz wiad matem 4 no.3:261-264 '61.

(Mathematicians, Polish)

SOBOLEV, S.L., akademik

Youth and science. Tekhnol. 29 no.9:10 '61. (MIRA 14:10)
(Science)

SISAKYAN, N.M., akademik; MINTS, I.I., akademik; SATPAYEV, K.I.; akademik; FRUMKIN, A.N., akademik; SHEMYAKIN, M.M., akademik; SOBOLEV, S.L., akademik; SHULEYKIN, V.V., akademik; BITSADZE, A.V.; MEL'NIKOV, N.V.; KHVOSTOV, V.M.; ROMASHKIN, P.S.; ABDULLAYEV, Kh.M.; DADYKIN, V.P., doktor biol.nauk; OBOLENTSEV, R.D., doktor khim.nauk; PONOMAREV, B.N.; BLAGONRAVOV, A.A., akademik; ARTSIMOVICH, L.A., akademik; KOSTENKO, M.P., akademik; NALIVKIN, D.V., akademik

Discussion of the report. Vest.AN SSSR 31 no.3:27-47 Mr '61. (MIRA 14:3)

1. AN Kazakhskoy SSSR (for Satpayev). 2. Chleny-korrespondenty AN SSSR (for Bitsadze, Mel'nikov, Khvostov, Romashkin, Abdullayev, Ponomarev).

(Research)

21557
S/020/61/137/003/005/030
C111/C222

16.6500

AUTHOR: Sobolev, S.L., Academician

TITLE: Formulas for mechanical cubatures in the n-dimensional space

PERIODICAL: Akademii nauk SSSR. Doklady, vol.137, no.3, 1961, 527-530

TEXT: The author considers the formula for the mechanical cubature

$$(l, \varphi) \int_{\Omega} \varphi dx - \sum_{k=1}^{N} C_k \varphi(x^{(k)}) \cong 0, \qquad (1)$$

where x is a point of a bounded n-dimensional region Ω, C_k -- coefficients, $x^{(k)}$ -- knot points. It is assumed that for polynomials of a certain degree m the error (l, φ) equals zero and that the boundary of Ω is piecewise smooth.
The fundamental problem of the theory of mechanical cubatures consists in the determination of

$$\min_{C_k, x^{(k)}} \left[\max |(l, \varphi)|\right] = d(X, N) \qquad (6)$$

for a given class of functions X for a given number of points N. In the

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Formulas for mechanical cubatures...

present paper the author considers only the first part of the fundamental problem, namely the determination of

$$\max_{x} |(l,\varphi)| = d(C_k, x^{(k)}), \tag{8}$$

where X -- unit sphere in the space of functions the m-th derivatives of which are integrable in the square. Let Ω be the parallelohedron Ω_o. Let $\widetilde{W}_2^{(m)}$ and $\widetilde{L}_2^{(m)}$ be the spaces of functions periodic in R_n with the periods $H\beta$, where H is defined by

$$H = (h_1, h_2, \ldots, h_n) \tag{2}$$

and every period h_k is defined by

$$h_k = \begin{pmatrix} h_{1k} \\ h_{2k} \\ \cdots \\ h_{nk} \end{pmatrix}; \tag{3}$$

while β is the integral column

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Formulas for mechanical cubatures...

$$\beta = \begin{pmatrix} \beta_1 \\ \beta_2 \\ \cdots \\ \beta_n \end{pmatrix}, \quad -\infty < \beta_k < +\infty . \tag{4}$$

The norms in $W_2^{(m)}$ and $\widetilde{W}_2^{(m)}$ are given by

$$\|\varphi\|^2_{W_2^{(m)}} = \|\Pi\varphi\|^2_{S_{m-1}} + \|\varphi\|^2_{L_2^m} = \|\Pi\varphi\|^2_{S_{m-1}} + D(\varphi), \tag{9}$$

$$\|\varphi\|^2_{\widetilde{W}_2^{(m)}} = \left(\int_{\Omega_0}\varphi dx\right)^2 + D(\varphi), \tag{10}$$

where Π -- projection operator from $W_2^{(m)}$ into the space S_{m-1} of the polynomials of m-th degree, and $L_2^{(m)}$ is the factor space $W_2^{(m)}/S_{m-1}$. Here

$$\|\varphi\|^2_{L_2^{(m)}} = D(\varphi) = \int_{\Omega} \sum_{|\alpha|=m} (D^\alpha \varphi)^2 dx. \tag{11}$$

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C111/C222

Formulas for mechanical cubatures...

In the non-periodic case the author puts $m_1=m-1$.
Three problems are formulated:
I. Determine max $(1,\varphi)$.

$$\|\varphi\|_{W_2^{(m)}}=1$$

II. Determine $\min_{(1,\varphi)=1} \|\varphi\|^2_{W_2^{(m)}}$.

III. Determine $\min H_\lambda(\varphi) = D(\varphi)+2\lambda(1,\varphi)$.
Each of these problems can be reduced to every other problem. The author considers III. From (9) it follows

$$H_\lambda(\varphi)\geq\left[\sqrt{D(\varphi)}-\lambda K\right]^2-\lambda^2K^2\geq-\lambda^2K^2. \qquad (14)$$

From the identity

$$1/_2H_\lambda(u_k)+1/_2H_\lambda((u_m)-H_\lambda((u_k+u_m)/<2)=D((u_k-u_m/(<2) \qquad (15)$$

it follows that if u_k is a minimal sequence then Πu_k is also minimal

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Formulas for mechanical cubatures...

and fundamental, the boundary value is a solution of III. The solutions of III for different λ differ only by one factor:

$$u_\lambda = \lambda u_1. \tag{17}$$

A consideration of $\psi(\mu) = H(\mu u_\lambda)$ shows that if there holds

$$H_\lambda(u_\lambda) = \min H_\lambda(u) = -d_\lambda(C_k, x^{(k)}), \tag{18}$$

then it follows

$$D(u_\lambda) = d_\lambda(C_k, x^{(k)}); \quad (1, u_\lambda) = -d_\lambda(C_k u^{(k)}). \tag{19}$$

Then the solutions of I and II are given by

$$u_I = u_1/d_1: \qquad u_{II} = -u_1/\sqrt{d_1}. \tag{20}$$

The solution in the periodic case is carried out analogously. The equation in variations for the solution of III for $\lambda = 1$ reads

$$2D(u_1, \xi) - 2\int \xi\, dx - 2\sum C_k \xi(x^{(k)}) = 0, \tag{21}$$

where $D(u_1, \xi) = \int \sum_{|\alpha|=m} D^\alpha u_1 D^\alpha \xi\, dx$, ξ is the admissible variation. In the

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Formulas for mechanical cubatures...

non-periodic case one obtains for u_1:

$$u_1 = \frac{\Gamma(n/2)2^{-2m}}{\Gamma(n/2+m)\Gamma(m+1)} r_k^{2m} - \sum_{k=1} c_k \frac{i^{n+1}2^{-2m+1}\pi^{n/2+1}}{\Gamma(m+n/2+1)\Gamma(m)} r_k^{n-2m} \times \begin{cases} 1 & (n \text{ odd}); \\ \lg r/2\pi i + u_1^* & (n \text{ even}), \end{cases} \quad (25)$$

where $r_k = |x-x^{(k)}|$, u_1^* is a solution of the polyharmonic equation $\Delta^m u_1^* = 0$ which satisfies the boundary conditions

$$B_k(u_1)|_S = 0. \quad (24)$$

Then the determination of u_1 is considered in the periodic case where (24) is omitted.
The obtained formulas permit to calculate the sought maximum of $(1, \varphi)$.

There are 11 Soviet-bloc and 2 non-Soviet-bloc references.

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21557
S/020/61/137/003/005/030
C111/C222

Formulas for mechanical cubatures...

ASSOCIATION: Institut matematiki Sibirskogo otdeleniya Akademii nauk SSSR (Mathematical Institute of the Siberian Branch of the Academy of Sciences USSR)

SUBMITTED: December 23, 1960

X

Card 7/7

21479
S/020/61/137/004/004/031
C111/C222

16.6500

AUTHOR: Sobolev, S.L., Academician

TITLE: On the interpolation of functions of n variables

PERIODICAL: Akademiya nauk SSSR. Doklady, vol.137, no.4,1961, 778-781

TEXT: Using the knots

$$x^{(k)}, \quad k=1,2,\ldots,N \tag{1}$$

the function $\varphi(x)$ of n variables is approximated by

$$\varphi(x) \approx \sum_{\nu=1}^{M} a_\nu \varphi_\nu(x), \tag{2}$$

where $\varphi_\nu(x)$ e.g. are the monomials x^α (x^α denotes $x_1^{\alpha_1} x_2^{\alpha_2} \ldots x_n^{\alpha_n}$, $|\alpha| = \alpha_1 + \alpha_2 + \ldots + \alpha_n \leq m$) then $M = (m+n)!/m!n!$. The values of $\varphi(x)$ in the points (1) form the vector

$$\varphi^k = \varphi(x^{(k)}), \quad k=1,2,\ldots,N. \tag{3}$$

If all integral vectors α $(\alpha_1,\ldots,\alpha_n)$ are numbered with non-negative

Card 1/5

On the interpolation...

components, where $|\alpha| \leq m$, then the set of the values of the monomials $x^{(k)^{\alpha_j}}$ forms the matrix

$$S_{j,k} = (x^{(k)^{\alpha_j}}) \qquad (4)$$

with N columns and M rows. Let a polynomial $Q = \sum_{j=1}^{M} a_j x^{\alpha_j}$ be equivalent to the vector $a(a_1, a_2, \ldots, a_M)$. The values of Q in the points (1) form the vector

$$Q^{(k)} = aS. \qquad (5)$$

The interpolation problem consists in the solution of (5) with respect to a for a given $Q^{(k)}$.
Let $r(s) = M \leq N$. Then

$$a = aSS_d^{-1} = Q^{(k)}S_d^{-1}, \qquad (6)$$

where S_d^{-1} is the right-hand inverse matrix of S.

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On the interpolation...

Furthermore, for an arbitrary polynomial Q it holds

$$Q = Q^{(k)} S_d^{-1} x^{\alpha}, \tag{7}$$

where x^{α} denotes the vector $(x^{\alpha_1}, x^{\alpha_2}, \ldots, x^{\alpha_M})$. The condition for the solvability of (5) reads

$$r \begin{pmatrix} S \\ Q^{(k)} \end{pmatrix} = r(S). \tag{8}$$

Substituting in (7) the vector $\varphi^{(k)}$ instead of $Q^{(k)}$ then one obtains the "interpolation polynomial"

$$P_{\varphi} = \varphi^{(k)} S_d^{-1} x^{\alpha} = \sum_{k=1}^{N} C_k(x) \varphi(x^{(k)}) \tag{9}$$

of the function φ.
The author considers the determination of the maximal error of the interpolation formula $\varphi(x) = P_{\varphi}(x)$. It holds

$$(j, \varphi) \equiv \varphi(z) - P_{\varphi}(z) = \varphi(z) - \sum_{k=1}^{N} C_k(z) \varphi(x^{(k)}), \tag{17}$$

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On the interpolation...

where $C_k(z) = S_d^{-1} z^{\alpha}$ and the $C_k(z)$ are connected by the conditions

$$(j, x^{\alpha_s}) = 0, \quad s = 1,2,\ldots,M. \tag{18}$$

The functional (j, φ) is bounded and linear in the space $W_2^{(m)}$ of the functions with m-th derivatives integrable in the square. The author applies the considerations of his earlier paper (Ref.1: DAN 137, no.3 (1961)) and states that in general it holds

$$|(j, \varphi)| \leq K(\Omega) \|\varphi\|_{W_2^{(m)}(\Omega)}, \tag{22}$$

where $K(\Omega)$ is a constant depending on the region Ω. If $\Omega_2 \subset \Omega_1$ then it holds

$$\max_{\|\varphi\|_{W_2^{(m)}(\Omega_1)}=1} (j, \varphi) \leq \max_{\|\varphi\|_{W_2^{(m)}(\Omega_2)}=1} (j, \varphi). \tag{23}$$

It is shown that $K(\Omega)$ tends to a fixed limit value K^{∞} for an unbounded extension of the region Ω.

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On the interpolation...

As an example the author considers the classical case r(S) = M = N, where (5) has a unique solution.
There is 1 Soviet-bloc reference.

ASSOCIATION: Institut matematiki Sibirskogo otdeleniya Akademii nauk SSSR (Mathematical Institute of the Siberian Branch of the Academy of Sciences USSR)

SUBMITTED: January 25, 1961

Card 5/5

PHASE I BOOK EXPLOITATION SOV/6257

Sobolev, Sergey L'vovich

Nekotoryye primeneniya funktsional'nogo analiza v matematicheskoy fizike (Some Applications of Functional Analysis to Mathematical Physics) Novosibirsk, Izd-vo AN SSSR. Sib. otd., 1962. 255 p. 3000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Sibirskoye otdeleniye.

PURPOSE: This book is intended for degree students and scientific workers.

COVERAGE: The book is a revision of a course of lectures given by the author at Leningrad State University. The monograph combines a number of problems from the theory of partial differential equations, treating them from a single point of view. Variational methods as applied to the Laplace equation and the polyharmonic equation are considered, as well as the Cauchy problem for linear and quasi-linear hyperbolic equations. A detailed consideration

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of certain new results and methods of functional analysis precedes and is the basis of the presentation of problems of mathematical physics. The author expresses gratitude to his students Kh. L. Smolitskiy and I. A. Yakovlev, who compiled his lecture notes and added a number of valuable supplements; several additions were also made by the author. A few references, all of them Soviet and almost all of them concerning former work of the author, appear in footnotes throughout the text.

TABLE OF CONTENTS:

SOBOLEV, S.L.

LURYE, A. I., Head, Mechanics Department, Leningrad Polytechnical Institute imeni M. I. Kalinin [1961 position] - "Some applications of classic variational methods to problems of control systems"

MIKHLIN, S. G., Leningrad State University [1961 position] - "Variational methods for solving linear and nonlinear boundary value problems"

NEMYTSKIY, V. V., Director, Institute of Mathematics and Mechanics, Moscow State University [1961 position] - "Some methods of qualitative examination in the large for systems of ordinary differential equations"

SOBOLEV, S. L., Director of the Institute of Mathematics and Computation Center, Siberian Department, Academy of Sciences USSR [1961 position] - "Some new problems in the theory of partial differential equations"

report to be submitted for the Conference on Differential Equations and their Applications, Prague, Czechoslovakia, 5-11 Sep 1962.

SOBOLEV, S. L.

"Quelques questions de la theorie des integrations numeriques et de l'interpolation pour les fonctions des plusieurs varibles independentes"

report submitted at the Intl Conf of Mathematics, Stockholm, Sweden, 15-22 Aug 62

SOBOLEV, S.L.; LYAPUNOV, A.A.

Mathematical problems in modern cybernetics. Izv. Sib. otd. AN SSSR no.5:3-13 '62. (MIRA 18:2)

16.6500,

S/199/62/003/005/004/004
B112/B186

AUTHOR: Sobolev, S. L.

TITLE: Mechanical cubature formulas on the surface of the sphere

PERIODICAL: Sibirskiy matematicheskiy zhurnal, v. 3, no. 5, 1962, 769-796

TEXT: The author considers sequences

$$(l^{(N)},f) = \iint_S f\,ds - \sum_{k=1}^{N} C_k f(x^{(k)}) \qquad (2,1)$$

/B

of error functionals to cubature formulas with point systems $\{x^{(k)}\}$ ($k = 1,2,..,N$) which are invariant under a certain group G of rotations of the sphere. An element g of G transforms a point x into an equivalent one. A functional (2,1) is said to be invariant under G if the coefficients C_k coincide for all points which are mutually equivalent. It is proved that an invariant cubature formula is valid for all the functions φ of an invariant finite-dimensional manifold then, and only then, if the error

Card 1/2

SOBOLEV, S., akad.

Poetry of mathematics. Nauka i tekh mladezh 14 no.4:7-9 Ap '62.

1. Direktor na instituta po matematika pri Sibirskiia otdel na Akademiia na naukite na SSSR.

S/020/62/146/001/003/016
B112/B108

AUTHOR: Sobolev, S. L., Academician

TITLE: Several types of convergence of cubature and quadrature formulas

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 146, no. 1, 1962, 41 - 42

TEXT: The author considers the functional $(l,f) = \int f d\Omega - \Sigma C_k f(X^{(k)})$, (1) where f is an element of a Banach space X or of a topological space τ. The function f that maps R_n onto X or τ is an element of a certain Banach space B or of a topological space T. X is assumed to be countably-dimensional. The convergence of cubature formulas is equivalent to the tendency to zero of certain operators $l^{(N)}$, which is described by the condition $(l^{(N)},f) = (0,0,\ldots,0,f_{k+1},f_{k+2},\ldots)$ (7) for any k (N depends on k). In linear countably-dimensional vector space, instead of the norm $\|(l^{(N)},f)\|_X$, the topologies $B_\alpha = (0,0,0,\ldots,0,f_{\alpha+1},f_{\alpha+2},\ldots)$ (9) are used.

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Several types of convergence...

In this case, for each neighborhood $\mathfrak{S}_\alpha$ consisting of the vectors $(0,0,0,\ldots,0,a_{\alpha+1},a_{\alpha+2},\ldots)$, a corresponding N can be found, so that $(1^{(N)},f)\in\mathfrak{S}_\alpha$ for $N>N(\alpha)$. (10) Two examples are considered..

SUBMITTED: May 29, 1962

SOBOLEV, S.L., akademik

Cubature formulas on a sphere, invariant with respect to transformations of finite rotation groups. Dokl. AN SSSR 146 no.2:310-313 S '62. (MIRA 15:9)
(Spherical harmonics)

SOBOLEV, S.L., akademik

Number of nodes of cubature formulaes on a sphere.
Dokl. AN SSSR 146 no.4:770-773 O '62. (MIRA 15:11)
(Spherical harmonics)

SOBOLEV, S.L. (Novosibirsk)

Cubature formulas. Studia math Ser spec no.1:117-118 '63.

KELDYSH, M.V., akademik; DORODNITSYN, A.A., akademik; SOBOLEV, S.L., akademik; TRAPEZNIKOV, V.A., akademik; STAROVSKIY, V.N.; KOEN, I., prof.psikhologii; BERNAL, D. (Angliya); PAUELL, S.; ARTSIMOVICH, L.A., akademik; NEMCHINOV, V.S., akademik

Science in the borderland of fantasy. Tekh.mo. 31 no.1:2 of cover, 2,7, '63. (MIRA 16:3)

1. Prezident AN SSSR (for Keldysh). 2. Chlen-korrespondent AN SSSR (for Starovskiy). 3. Manchesterskiy universitet, Angliya (for Koen). 4. Prezident Vsemirnoy federatsii nauchnykh rabotnikov (for Pauell).
(Science)

SHCHERBAKOV, D.I., akademik; FRUMKIN, A.N., akademik; KHACHATUROV, T.S.; VINOGRADOV, A.P., akademik; SOBOLEV, S.L., akademik; KOSTENKO, M.P., akademik; TOLSTOV, S.P.; SAZHIN, N.P.; KAZARNOVSKIY, I.A.; VUL, B.M.; TROFIMUK, A.A., akademik

Discussion of the annual report. Vest. AN SSSR 33 no.3:25-34 Mr '63. (MIRA 16:3)

1. Chleny-korrespondenty AN SSSR (for Khachaturov, Tolstov, Sazhin, Kazarnovskiy, Vul).

(Academy of Sciences of the U.S.S.R.)

SOBOLEV, S.L.

Density of finite functions in an $L_p^{(m)}(E_n)$ space. Sib. mat. zhur. 4 no.3:673-682 My-Je '63. (MIRA 16:6)
(Functional analysis) (Spaces, Generalized)

SOBOLEV, S., akademik

Space and time are a physical reality. Tekh.mol. 31 no.9:17 '63. (MIRA 16:9)

(Space and time)

SOBOLEV, S.L., akademik

Density of finite functions in the $L_p^{(m)}(E_n)$ space. Dokl.AN SSSR 149 no.1:40-43 Mr '63. (MIRA 16:2)

1. Institut matematiki s vychislitel'nym tsentrom Sibirskogo otdeleniya AN SSSR.

(Functions)

L 59506-65 EWT(d)/T IJP(c) UR/0020/65/162/005/1005/1008

ACCESSION NR: AP5017451

AUTHOR: Sobolev, S. L. (Academician)

TITLE: Order of convergence of cubature formulas

SOURCE: AN SSSR. Doklady, v. 162, no. 5, 1965, 1005-1008

TOPIC TAGS: cubature formula, convergent series

ABSTRACT: The author proves two theorems concerning error of cubature formulas in the region Ω of n independent variables. Here the error is considered as a linear functional of form

$$l(x) = \xi_\Omega(x) - \sum_{k=1}^{N} c_k \delta(x - x^{(k)}) \quad (1)$$

in $L_2^{(m)}(E_n)$, square integrable functions with m derivatives and norm

$$\|\varphi\|_{L_2^{(m)}} = \left\{ \int_{E_n} \sum_{\alpha_1 + \ldots + \alpha_n = m} (D^\alpha \varphi)^2 dx \right\}^{1/2}. \quad (2)$$

and ξ_Ω is the set characteristic function of Ω. Theorem 1. There exists a constant K_1 depending only on the numbers m, n, such that

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$$\|l\|_{L_2(m)^*} \geqslant K_1\sqrt{|\Omega|}h^m. \tag{3}$$

Theorem 2. Suppose the functional of error $l(x)$ can be represented in the form

$$l(x) = \sum_\gamma l_\gamma(x/h - \gamma), \tag{4}$$

where γ runs over all points of an integer grid, where $l_\gamma(y)$ satisfies the conditions

$$(l_\gamma(y), y^\alpha) = 0, \ |\alpha| \leqslant m; \tag{5}$$

$$\|l_\gamma(y)\|_{L_2(m)^*} < A; \tag{6}$$

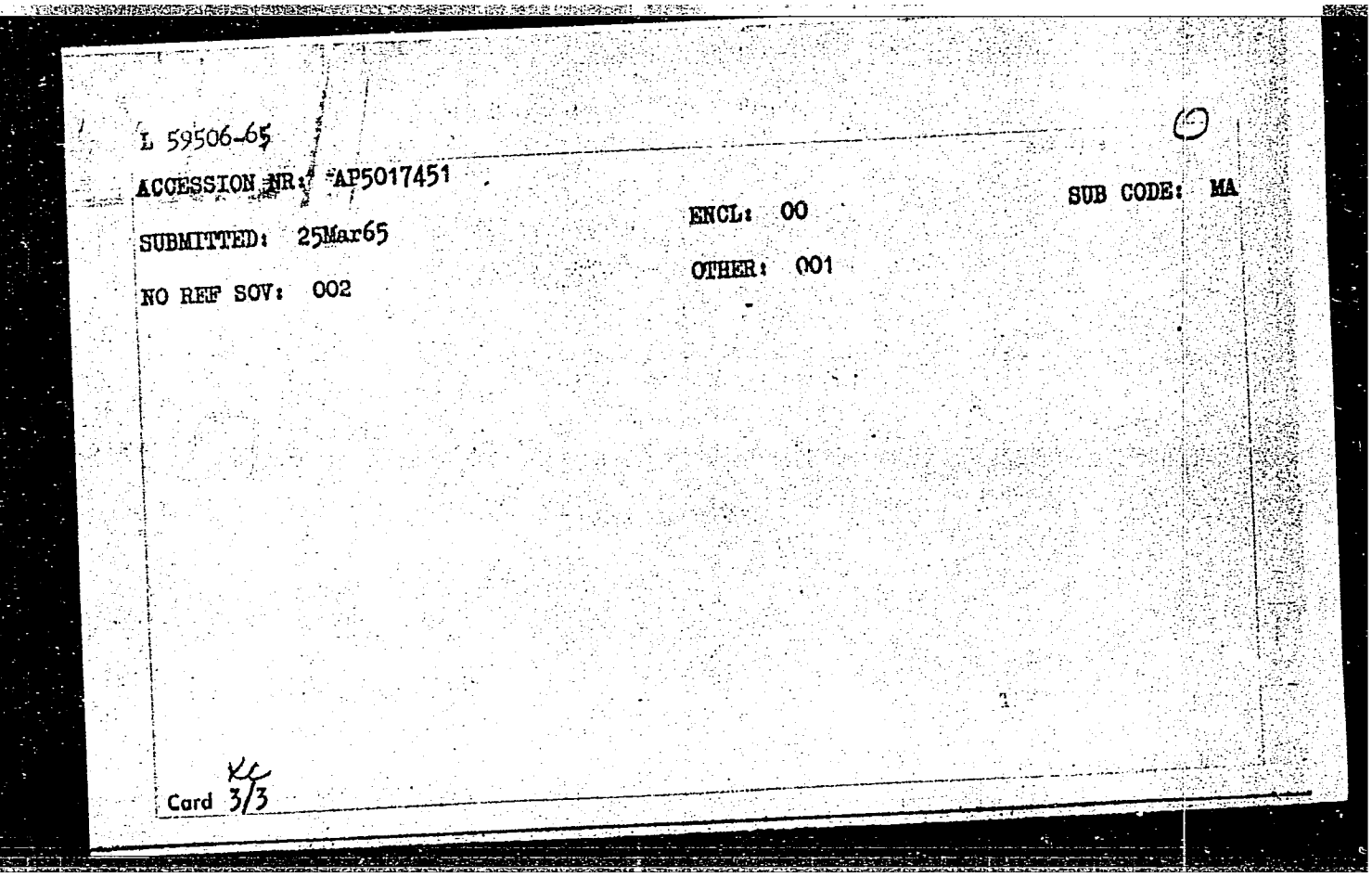
$$S\{l(y)\} \in \mathfrak{S}(|y| < L) \tag{7}$$

($S\{l(y)\}$ denotes the support of $l(y)$). Then for the norm of $l(x)$ we have the inequality

$$\|l(x)\|_{L_2(m)^*} < K_2 h^m, \tag{8}$$

where the constant K_2 depends on the form of the region Ω and the numbers A and Γ, but does not depend on the form of the functionals $l_\gamma(y)$. Orig. art. has: 34 formulas.

ASSOCIATION: Institut matematiki, Sibirskogo otdeleniya, Akademii nauk SSSR (Institute of Mathematics, Siberian Division, Academy of Sciences SSSR)



L 59506-65

ACCESSION NR: AP5017451

SUBMITTED: 25Mar65

NO REF SOV: 002

ENCL: 00

OTHER: 001

SUB CODE: MA

Card 3/3

SOBOLEV, S.L., akademik

Convergence of approximate integration formulae on functions from L'_{p_2}. Dokl. AN SSSR 162 no.6:1259-1261 Je '65. (MIRA 18:7)

1. Institut matematiki Sibirskogo otdeleniya AN SSSR.

L 62661-65 EWT(d)/T LJP(c)
ACCESSION NR: AP5018067 UR/0020/65/163/001/0033/0035

AUTHOR: Sobolev, S. L. (Academician) 55

TITLE: Computation of integrals of infinitely differentiable functions

SOURCE: AN SSSR. Doklady, v. 163, no. 1, 1965, 33-35

TOPIC TAGS: differential equation, integral equation

ABSTRACT: Let φ be a real valued infinitely differentiable periodic function in $S(A, \beta)$, the class of functions whose derivatives of order α are subject to

$$|D^{\alpha}\varphi / \alpha!| < KA^{|\alpha|}|\alpha|^{(\beta-1)|\alpha|} \quad (1)$$

where $\alpha! = \alpha_1! \ldots \alpha_n!$ and notation is from previous papers (DAN, 162, No. 6, 1965; DAN, 162, No. 5, 1965). The author gives the following asymptotic estimate of the error of the cubature formula with nodes at the points $hH\gamma$ for $h \to 0$

$$|(l, \varphi)| \leqslant Kh^{-1/\beta} \exp\left[-\frac{\beta}{e}\left(\frac{Ah}{2\pi e r_{\min}}\right)^{-1/\beta}\right]. \quad (2)$$

Orig. art. has: 17 formulas.

Card 1/2

L 62661-65

ACCESSION NR: AP5018067

ASSOCIATION: Institut matematiki, Sibirskogo otdeleniya, Akademii nauk SSSR (Institute of Mathematics, Siberian Division, AN SSSR)

SUBMITTED: 25Mar65 ENCL: 00 SUB CODE: MA

NO REF SOV: 002 OTHER: 000

Card 2/2

L 64148-65 EWT(1)/EWP(m)/FCS(k)/EWA(1) WW

ACCESSION NR: AP5019420 UR/0020/65/163/003/0587/0590

AUTHOR: Sobolev, S. L. (Academician)

TITLE: Cubature formulas with a regular boundary layer

SOURCE: AN SSSR. Doklady, v. 163, no. 3, 1965, 587-590

TOPIC TAGS: functional equation, boundary layer theory

ABSTRACT: The functional equation $l(x)=\sum_{\gamma} l_{\gamma}\left(\frac{x}{h}-H\gamma\right)$ is studied under the following three conditions:

1) $l_{\gamma}(x)=g_{\gamma}(x)-\sum_{\gamma'} C_{\gamma}^{\gamma'}\delta(x-hH\gamma')$, $\sum g_{\gamma}\left(\frac{x}{h}-\gamma\right)=g_0(x)$; 2) Все $l_{\gamma}(x)\in\Re(L,A,s)$;

3) when $d(hH\gamma, \Gamma)>2Lh$, $l_{\gamma}(x)=l_0(x)$. The functionals $l(x)$ are called functionals with a regular boundary layer of order m. The following theorem is proved with the aid of four lemmas: if $h\to 0$ for all functionals $l(x)$ with a regular boundary layer of order s, then the following equality holds:

$$\|l(x)\|_{L_2^{(m)}}=\left(\frac{h}{2\pi}\right)^m V\overline{\zeta(H^{-1}, 2m)}\,V\overline{|\Omega|}+O(h^{m+1}).$$

Card 1/2

L 64148-65

ACCESSION NR: AP5019420

Orig. art. has: 29 formulas.

ASSOCIATION: Institut matematiki Sibirskogo otdeleniya Akademii nauk SSSR (Mathematics, Institute Siberian Department, Academy of Sciences SSSR)

SUBMITTED: 03May65 ENCL: 00 SUB CODE: MA

NO REF SOV: 001 OTHER: 000

Card 2/2

SOBOLEV, S.L., akademik

Difference analog of a polyharmonic equation. Dokl. AN SSSR 164 no.1:54-57 S '65. (MIRA 18:9)

1. Institut matematiki Sibirskogo otdeleniya AN SSSR.

L 8940-66 EWT(d)/T/EWP(1) IJP(c)
ACC NR: AP5023996 SOURCE CODE: UR/0020/65/164/002/0281/0284

AUTHOR: Sobolev, S. L. (Academician)

ORG: Institute of Mathematics of the Siberian Division of the Academy of Sciences, SSSR (Institut matematiki Sibirskogo otdeleniya Akademii nauk SSSR)

TITLE: Optimal mechanical cubature formulae with nodes at points of regular lattices

SOURCE: AN SSSR. Doklady, v. 164, no. 2, 1965, 281-284

TOPIC TAGS: approximation calculation, numerical analysis, integration

ABSTRACT: The author establishes, in a series of theorems, that the optimal coefficients of cubature formulae using a regular lattice of nodes have the same principal term in the norm generated by the error functional as formulae with a regular boundary layer. This work is a continuation of previous works of the author in which he studied the norm of the error functional $L_2^{(m)*}$ for cubature formulae for finite functions with constant coefficients and nodes in a rectangular lattice, as well as for formulae with a regular boundary layer in regions with a rather smooth boundary. Orig. art. has: 10 formulas. [04]

SUB CODE: MA/ SUBM DATE: 24May65/ ORIG REF: 010

Card 1/1

L 7051-66 EWT(d) IJP(c)

ACC NR: AP5027830 SOURCE CODE: UR/0020/65/165/001/0040/0043

AUTHOR: Sobolev, S. L. (Academician) 44,55

ORG: Institute of Mathematics, Siberian Division of the Academy of Sciences, SSSR (Institut matematiki, Sibirskogo otdeleniya Akademii nauk SSSR)

TITLE: Representation of analytic periodic functions by a sum of squares

SOURCE: AN SSSR. Doklady, v. 165, no. 1, 1965, 40-43

TOPIC TAGS: differential equation 16, 44, 55

ABSTRACT: The author proves two theorems, both of which yield conditions under which the Fourier transform of an operator L can be represented in the form

$$\tilde{L}(p) = \sum_{\alpha} |\tilde{L}_{\alpha}(p)|^2.$$

Orig. art. has: 17 formulas.

SUB CODE: MA/ SUBM DATE: 09Aug65/ ORIG REF: 003

Card 1/1 UDC: 517.512

L 17895-66 EWT(d) IJP(c)
ACC NR: AT6009991 SOURCE CODE: CZ/0026/65/010/002/0096/0129

AUTHOR: Babushka, Ivo--Babuska, I. (Doctor of sciences); Sobolev, S. L. (Academician)

ORG: [Babushka] Mathematics Institute, CSAV, Prague (Matematicky ustav CSAV); [Sobolev] Siberian Section, AN SSSR, Novosibirsk (Sibirskoye otdeleniye AN SSSR) 29

TITLE: Optimization of numerical methods 12, 44, 55 8

SOURCE: Aplikace matematiky, v. 10, no. 2, 1965, 96-129

TOPIC TAGS: numeric analysis, linear function, optimization, linear logic

ABSTRACT: The article reviews and summarizes the latest concepts on the optimization of concrete problems, on asymptotically optimal results for calculations of linear functionals, and on the optimization of linear problems. The authors thank N. S. Bakhvalov for assistance. Orig. art. has: 74 formulas. [JPRS]

SUB CODE: 12 / SUBM DATE: none / OTH REF: 013 / SOV REF: 027

Card 1/1 TS 2

L 27071-66 EWT(d) IJP(c)

ACC NR: AP6017470 SOURCE CODE: UR/0020/65/162/006/1259/1261

AUTHOR: Sobolev, S. L.(Academician) 23 13

ORG: Institute of Mathematics, Siberian Branch, AN SSSR(Institut matematiki sibirskogo otdeleniya AN SSSR) 16

TITLE: Convergence of approximate integration formulas to functions of L sub 2 (m)

SOURCE: AN SSSR, Doklady, v. 162, no. 6, 1965, 1259-1261

TOPIC TAGS: integration, vector function

ABSTRACT: In earlier papers the author established that an extremal function u(x), a function on which the error functional reaches a maximum on a sphere of unit radius in $L_2^{(m)}$, is a solution to a polyharmonic equation having the right-hand side

$$\Delta^m u = (-1)^{m+1} l(x).$$

In this paper the author examines periodic functions of a variable given on a torus Ω and a system of nodes of a cubature formula of the form

$$x^{(\gamma)} = hH\gamma,$$

where $x^{(\gamma)}$ is the column vector of the point coordinates, γ is integral column vector, H is a matrix with a single determinant, and h is a small parameter. Two theorems are proved. Orig. art. has: 28 formulas [JPRS]

Card 1/1 SUB CODE: 12/ SUBM DATE: 25Mar65 ORIG REF: 002

L 17789-66 EWT(d) IJP(c)
ACC NR: AP6004084 SOURCE CODE: UR/0020/66/166/002/0295/0297

AUTHOR: Sobolev, S. L. (Academician) 21 B

ORG: Institute of Mathematics, Siberian Division of the Academy of Sciences, SSSR (Institut matematiki Sibirskogo otdeleniya Akademii nauk SSSR)

TITLE: Construction of cubature formulae with regular boundary layer

SOURCE: AN SSSR. Doklady, v. 166, no. 2, 1966, 295-297

TOPIC TAGS: cubature, approximation calculation, boundary layer problem

ABSTRACT: The author proves four results for higher dimensional cubature formulae based on analytic and combinatorial nongeometric considerations related to convex polygons and an integer grid. He shows that for each rational polygon there exist cubature formulae of the form

$$l(x) = g_0(x)\left[1 - \Phi_0(h^{-1}x) - \sum_{k,j}\psi_k^{(j)}(x)\right], \quad (1)$$

where $\psi_k^{(j)}(x)$ denotes the point functional

$$\psi_k^{(j)}(x) = \sum_{h^{-1}\gamma \in \Omega_k^{(j)}} C_\gamma \delta(x - h^{-1}\gamma), \quad (2)$$

Card 1/2 UDC: 517.392

and C_γ in (2) is invariant under shifts on the vector $\gamma \in R_k$. He proves that every function of order m of the form (1) for a convex (n-k)-bounded angle with k-dimensional boundary at the vertex allows the representation

$$l(x) = \sum_{\gamma \geq 0} l_0(x - h^{-1}\gamma), \qquad (3)$$

where $l_0(x)$ is orthogonal to $x^\alpha (|\alpha| = m)$. It is established that every error functional of order m of the form (3) for a convex angle with k-dimensional boundary is a functional with regular boundary layer. Finally it is shown that the error functional $l_0(x)$ of order m of the form (3) for any bounded convex polygon can be represented in the form of a linear combination of error functionals of all of their convex k-bounded angles:

$$l_\Omega(x) = -\sum_{s=0}^{n} (-1)^{n-s} \sum_{j=1}^{Q(s)} l_{\Omega(j)}(x). \qquad (4)$$

Orig. art. has: 12 formulas.

SUB CODE: 12/ SUBM DATE: 28Aug65/ ORIG REF: 005

Card 2/2 vmb

SOBOLEV, S.M.

Histochemical study on certain PAS-positive substance in macrophages. Biul. eksp. biol. med. 47 no.5:104-109 My '59. (MIRA 12:7)

1. Iz otdela meditsinskoy mikrobiologii (zav. - chlen-korrespondent AMN SSSR prof. V. L. Troitskiy) Instituta epidemiologii i mikrobiologii imeni N.F. Gamalei (dir. - prof. S.N. Muromtsev) AMN SSSR, Moskva. Predstavlena deystvitel'nym chlenom AMN SSSR V. N. Chernigovskim.

(STAINS AND STAINING,
periodic acid Schiff reaction, histochem. studies on positive macrophages (Rus))

SOBOLEV, S.M.; FRIDENSHTEYN, A.Ya.

Mechanism of phagocytic disorders in the appendix in X-irradiated rabbits. Med. rad. 5 no.11:36-40 N '60. (MIRA 13:12)
(PHAGOCYTOSIS) (X RAYS--PHYSIOLOGICAL EFFECT)
(APPENDIX)

SOBOLEV, S.M. (Moskva, G-19, Arbatskaya pl., 2/4, kv.14)

Development of the phagocytic apparatus of the wall of the appendix of rabbits in ontogenesis. Arkh. anat. gist. i embr. 42 no.1:78-83 Ja '62. (MIRA 15:4)

1. Otdel radiatsionnoy mikrobiologii i immunologii (zav. - deystvitel'nyy chlen AMN SSSR prof. V.L.Troitskiy) Instituta epidemiologii i mikrobiologii imeni Gamaleya AMN SSSR.

(APPENDIX (ANATOMY)) (PHAGOCYTOSIS)

CHAKHAVA, O.V.; SOBOLEV, S.M.

Study of the phagocytic process in vitro in a bone marrow histiocyte culture. Biul. eksp. biol. i med. 53 no.1:74-76 Ja '62. (MIRA 15:3)

1. Iz otdela radiatsionnoy mikrobiologii i immunologii (zav. - deystvitel'nyy chlen AMN SSSR V.L. Troitskiy) Instituta epidemiologii i mikrobiologii imeni N.F. Gamalei (dir. - prof. O.V. Baroyan) AMN SSSR, Moskva. Predstavlena deystvitel'nym chlenom AMN SSSR V.L. Troitskim.
(PHAGOCYTOSIS) (MARROW)
(TISSUE CULTURE)

SOBOLEV, S.M.

Experimental study of the phagocytic apparatus of the wall of the appendix in the rabbit. Biul.eksp.biol.i med. 53 no.6:91-95 Je '62. (MIRA 15:10)

1. Iz otdela radiatsionnoy mikrobiologii i immunobiologii (zav. - deystvitel'nyy chlen AMN SSSR V.L.Troitskiy) Instituta epidemiologii i mikrobiologii imeni N.F.Gamalei AMN SSSR, Moskva. Predstavlena deystvitel'nym chlenom AMN SSSR V.L.Troitskim.
(PHAGOCYTOSIS) (APPENDIX (ANATOMY))

SOBOLEV, S.M.

Effect of the methylation reaction on basophilia (metachromasia). Biul.eksp.biol.i med. 57 no.5:116-119 My '64.

(MIRA 18:2)

1. Otdel radiatsionnoy mikrobiologii i immunologii (zav. - doktor med. nauk M.A.Tumanyan) Instituta epidemiologii i mikrobiologii imeni N.F.Gamalei (dir. - prof. P.A.Vershilova) AMN SSSR, Moskva. Submitted August 10, 1963.

PERSHINA, Z.G.; SOBOLEV, S.M.

Simple method for obtaining a culture from a single microbial cell. Lab. delo no. 12:737-739 '64. (MIRA 18:1)

1. Institut epidemiologii i mikrobiologii im. N.F.Gamalei (direktor - prof. P.A.Vershilova), otdel radiatsionnoy mikrobiologii i immunologii (zaveduyushchiy - doktor med. nauk M.A.Tumanyan), Moskva.

[illegible], A.M.

Histochemical analysis of PAS-positive substances in the reticular cells of the vermiform process in rabbits. Zhur. mikrobiol. epidem. i immun. 40 no.7:115-118 Jl '63. (MIRA 16:8)

1. Otdel radiatsionnoy mikrobiologii i immunologii (zav. - doktor med. nauk M.A. Tumanyan) Instituta epidemiologii i mikrobiologii imeni N.F. Gamaleya (direktor - prof. I.A. Vershilova) AMN SSSR, Moskva.

PERSHINA, Z.G.; VASIL'YEVA, I.G.; SOBOLEV, S.M.

Changes in the properties of bacteria of the enteric group under the effect of radioactive phosphorus P^{32}. Zhur. mikrobiol., epid. i immun. 42 no.8:142-143 Ag '65. (MIRA 18:9)

1. Institut epidemiologii i mikrobiologii imeni Gamalei AMN SSSR.

L 11277-67 EWT(1)/EWT(m) JH/JD

ACC NR: AT6029636 SOURCE CODE: UR/0000/66/000/000/0273/0277

AUTHOR: Pershina, Z. G.; Koznova, L. B.; Sobolev, S. M.; Khrushchev, V. G.

ORG: none

TITLE: Influence of dose rate and time factor on the bactericidal effect of irradiation

SOURCE: Voprosy obshchey radiobiologii (Problems of general radiobiology). Moscow, Atomizdat, 1966, 273-277

TOPIC TAGS: microorganism contamination, gamma irradiation, particular radiation biologic effect, irradiation intensity

ABSTRACT: Experiments were conducted on vegetative microorganisms, B. coli 613, and on spore form microorganisms, B. anthracoides, to determine the influence of dose rate and time on the bactericidal effect of irradiation. B. coli 613 were gamma irradiated with single 50 kr doses at dose rates of 111.5 r/min (7 hr 29 min), 334.5 r/min (2 hrs 29 min), 600 r/min (83 min 20 sec) and 14,760 r/min (3 min 23 sec). The highest bactericidal effects were found with dose rates of 111.5 and 334.5 r/min. Similar results were found with irradiation of B coli 613 with a 100,000 r dose at dose rates of 107 r/min (15 hrs 35 min) and 320 r/min (5hrs 12 min 30 sec). A complete bactericidal effect was achieved with the 107 r/min dose rate, while with the 320 r/min

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L 11077-67
ACC NR: AT6029636

dose rate the bacterial colonies increased by 2.3×10^{-5}%. In experiments on S. anthracoides, irradiation with a 800,000 r dose at a dose rate of 174 r/min produced a complete bactericidal effect, whereas a dose rate of 48,000 r/min increased the number of bacteria by 9×10^{-2}%. With irradiation of bacteria in higher concentrations using the same dose, a comparable dependence of bactericidal effect on dose rate is found, but is less markedly expressed. Experimental data show that increase of irradiation time in the dose rate range of 111.5 to 48,000 r/min increases the bactericidal effect. Future studies should be directed toward finding optimal irradiation conditions for complete bactericidal effects. Orig. art. has: 2 tables.

SUB CODE: 06/ SUBM DATE: 23Apr66/ ORIG REF: 005/ OTH REF: 005

Card 2/2 jb

SOV/96-58-8-3/22

AUTHORS: Sobolev, S.P. and Granov, V.Ye. (Engineers)

TITLE: The Modernisation of Turbine VR-25-1 of the Khar'kov Turbine Works, and Analysis of the Results obtained. (Modernizatsiya turbiny VR-25-1 Khar'kovskogo turbinogo zavoda i analiz poluchennykh rezul'tatov)

PERIODICAL: Teploenergetika, Nr 8, 1958, pp 13-16 (USSR)

ABSTRACT: Recent improvements in blading design have given much better stage efficiencies in turbine test rigs. The main object of the modernisation of turbine type VR-25-1 carried out by the Khar'kov Turbine Works in 1956 was to verify in practice the effectiveness of the new principles of designing the flow paths of turbines and to see whether the improvement corresponded to that obtained in rig tests. The new guide vanes and working blades had profiles C-1 and T-2a respectively. The new blades were made narrower than the old and the stage reaction was increased from 5 to 12-15% to obviate negative reaction at the blade roots. Other changes that were made in the turbine are described; loss calculations are considered and the old and new designs are compared in Table 1. The reconstructed turbine was tested three times by the All-Union Thermo-Technical Institute.

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SOV/96-58-8-3/22

The Modernisation of Turbine VR-25-1 of the Khar'kov Turbine Works, and Analysis of the Results obtained.

The test results were given in an article by Rubinshteyn, Gribkov and Yedigarev in Teploenergetika Nr 9, 1957. After modernisation the pressure in the regulating stage chamber was much lower than before at the same discharge rate. Modernisation of the turbine increased the efficiency by only 2½ - 3%, but this article shows that if the effects of a number of secondary factors are excluded the increase in efficiency should be of the expected order of 8½%. The defects are mainly that the outlet angles from the guide vanes are not of the designed values, which gives rise to high losses in steam distribution and excessive drop in the regulated stage.

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SOV/96-58-8-3/22

The Modernisation of Turbine VR-25-1 of the Khar'kov Turbine Works, and Analysis of the Results obtained.

Contrary to the conclusion of the previous article, the full efficiency of the new blading would be realised if the small errors in angle were eliminated.

There are: 1 fig, 2 tables and 1 Soviet literature reference.

ASSOCIATION: Khar'kovskiy turbinnyy zavod (Khar'kov Turbine Works)

Card 3/3 1. Turbines--Design 2. Turbines--Analysis 3. Turbine blades --Test methods

SOV/96-59-3-5/21

AUTHORS: Sobolev, S.P., Engineer: Shneydman, A.Ye., Candidate of Technical Sciences: Zel'des, N.Ya., Engineer: Sukhinin, V.P., Engineer and Shor, L.A., Engineer

TITLE: Experience in Developing the Blading for the Last Stage of a 150-MW Turbine (Opyt sozdaniya lopatki posledney stupeni dlya turbiny moshchnost'yu 150 Mvt)

PERIODICAL: Teploenergetika, 1959, Nr 3, pp 26-29 (USSR)

ABSTRACT: For a long time the Khar'kov Turbine works has been developing last-stage blading for large turbines, leading, in 1956-7, to a rational series of designs. All the blades in the series are designed on common principles and are standardised as much as possible. Blades with an active length of 740 mm were installed in a 100-MW turbine that commenced operation in 1957. Blading for the last stage of the PVK-150, 150-MW turbine, illustrated in Fig.1, is designed for a speed of 3,000 rpm and has an active length of 780 mm. It is based on profile T3 recommended by the Central Boiler-Turbine Institute. The stationary nozzle vanes were of sheet steel. The main aerodynamic characteristics of the blade are tabulated. Successive

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Experience in Developing the Blading for the Last Stage of a 150-MW Turbine

stages in profiling of the blade are described. The blading was made of stainless chrome steel 1Kh13 and the stress levels conformed to its properties. The stress distribution over the length of the blade is plotted in Fig.2 and does not exceed 2,630 kg/cm^2. By means of resistance strain gauges, vibration studies were made on a special experimental wheel in a vacuum chamber. A considerable number of resonant frequencies in the blading were disclosed. The blading was then de-tuned to 300 c/s, leaving four types of oscillation which are described. Various constructions were studied in order to reduce these vibrations and finally two conventional hoops of stiffening "wire" were threaded through the blading in the usual manner. Actually the "wire" consisted of tubing with an external diameter of 15 mm and a wall thickness of 2 mm. Because of the high centrifugal forces side-entry blade attachment was adopted, using serrated roots of diminishing cross-section, with six steps in the "fir tree", as drawn in Fig.3. The method of assembling the blading in the wheel is described and

Experience in Developing the Blading for the Last Stage of a 150-MW Turbine

illustrated photographically in Fig.4. The blades are made from forgings each weighing 35 kg. The method of manufacture is described and, despite the large size, no special difficulties arose. It is considered that it will be possible to make still larger blades. There are 4 figures and 1 table.

ASSOCIATION: Khar'kovskiy turbinnyy zavod (Khar'kov Turbine Works)

SOBOLEV, S. P.

4

PHASE I BOOK EXPLOITATION SOV/6341

Shubenko-Shubin, Leonid Aleksandrovich, Corresponding Member, Academy of Sciences USSR, David Mikhaylovich Gerner, Natan Yakovlevich Zel'des, Vilor L'vovich Ingul'tsov, Vladimir Zel'manovich Kogan, Moisey Yosifovich Pokrassa, Sergey Petrovich Sobolev, Viktro Pavlovich Sukhinin, Anatoliy Vitol'dovich Trzhetsinskiy, Avadiy Yefimovich Shneydman

Prochnost' elementov parovykh turbin (Strength of Steam Engine Parts). Moscow, Mashgiz, 1962. 567 p. Errata slip inserted. 4000 copies printed.

Reviewer: B. M. Panshin; Ed.: R. A. Nikiforova, Engineer; Tech. Ed.: M. S. Gornostaypol'skaya; Chief Ed.: Mashgiz (Southern Dept.): V. K. Serdyuk, Engineer.

PURPOSE: This book is intended for steam-turbine designers and service and engineering personnel in the steam-turbine industry. It may also be useful as a special textbook for teachers and students specializing in the steam- and gas-turbine industry.

Card 1/12

Strength of Steam Engine Parts SOV/6341

COVERAGE: This book contains material on the structural strength problems of all basic steam-turbine parts. Industrial methods of calculating turbine blades, disks, rotors, diaphragms, housings, etc., some described for the first time, are given. Metal strength and methods for its control are described in detail.

TABLE OF CONTENTS [Abridged]:

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S/114/62/000/004/002/008
E114/E654

26.2120

AUTHOR: Shubenko-Shubin L.A. Corresponding Member AS UkrSSR, Sobolev, S.P. and Poznakhirev, V.F., Engineers

TITLE: Design of last stage blading for large steam turbines.

PERIODICAL: Energomashinostroyeniye, no.4, 1962, 5 - 10

TEXT: Unit output is limited by the maximum permissible length of the last stage turbine blade. The authors discuss the present state of art and describe methods used in the design of blades at the Khar'kovskiy turbinnyy zavod imeni Kirova (Khar'kov Turbine Works imeni Kirov (KhTGZ). A table is given showing the main characteristics of longest blading developed in various countries in Europe and U.S.A. and claiming that the longest blades already in service, 1050 mm., were made in USSR and correspond to the peripheral speed of 565 m/sec. Blade design proceeds by successive approximations. The first approximation of permissible blade length is given as a function of the specific gravity and elastic limit of the blade material, r.p.m., the ratio of total blade stress to the stress in an

Card 1/ 4

S/114/62/000/004/002/008
E114/E654

Design of last stage ...

equivalent blade of uniform cross-section, safety factor and a ratio of mean diameter of the stage to blade length. The optimum design leads to minimum stresses in the blade by determining the appropriate relative position of different blade sections and of the whole blade relative to the disc. The following forces acting on a blade were taken into account: centrifugal, bending due to steam loading, bending moment due to spatial difference between the centre of gravity of a section and its projection onto the centre of gravity of the complete blade. Certain stresses were neglected, such as bending due to steam loading relative to the axis of the maximum moment of inertia, torque due to action of centrifugal force on a bent blade of variable section and action of the working fluid on a bent blade, bending stress due to forming the blade by bending and also bending due to the temporary deformation of the blade by the

Card 2/4

S/114/62/000/004/002/008
E114/E454

Design of last stage ...

centrifugal forces. Usual formulae are given for the centrifugal stress in the blade at a given section. For ease of calculation the bending moments due to steam loading are calculated separately in tangential and axial direction and then added vectorially. The eccentric action of the centrifugal force on any given intermediate section of the blade causes a bending stress relative to the axis of the minimum moment of inertia. A general approximate equation is derived. The stress in the blade can be reduced by inclining the blade bodily in axial or tangential directions; or its working part can be displaced with respect to its root. Or, most effective of all, it can be bent tangentially. When, by these means, the stresses on the leading and the trailing edge and on the back of the blade are all made equal, it will correspond to the minimum total stress in the blade. An example is given of a calculation for a blade to be formed by milling, with rotation and bending. The basis

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S/114/62/000/004/002/008
E114/E654

Design of last stage ...

of calculating the bending is the equality of stresses, and an expression is derived for increments of bending in terms of a system of co-ordinates. This was found too cumbersome for analytical solution and a trial and error method was adopted. By these means it was possible to design a blade which had uniform strength over 70% of its length. The maximum stresses due to steam loading occur not at the root but at a point 65% along the length of the blade. A table is given showing main characteristics of the last stage blading designed by the KhTGZ; the safety factor is between 1.56 and 1.7, and the bending stresses due to steam loading do not exceed 200-230 kg./cm^2. There are 6 figures and 2 tables.

Card 4/4

POZNAKHIREV, V.F.; SOBOLEV, S.P.

Determining optimem spatial position of a rotor blade in the final stage of a powerful heat turbine. Sbor.trud.Lab.gidr.mash.AN URSR no.10:72-84 '62. (MIRA 15:12)

(Turbines—Blades)

SHUBENKO-SHUBIN, L.A.; SOBOLEV, S.P., inzh.; POZNAKHIREV, V.F., inzh.

Thermal calculations and analysis of laws governing the twisting of the terminal stages of large steam turbines. Energomashinostroenie 8 no.10:1-6 O '62. (MIRA 15:11)

1. Chlen-korrespondent AN UkrSSR (for Shubenko-Shubin).
(Steam turbines)

ACCESSION NR: AP4045905 S/0114/64/000/009/0001/0005

AUTHOR: Shubenko-Shubin, L. A. (Corresponding member AN UkrSSR); Sobolev, S. P. (Engineer); Poznakhirev, V. F. (Engineer)

TITLE: Designing the profile of rotor blades for the last stages of high-power steam turbines

SOURCE: Energomashinostroyeniye, no. 9, 1964, 1-5

TOPIC TAGS: turbine, steam turbine, turbine blade, turbine blade shape

ABSTRACT: Methods of blade profile design are considered which envisage production techniques imposing certain limitations on the design, such as plano-milling by profile cutters. A set of "aerodynamically complete profiles" is used in the designing. All sections of the blade profile are designed simultaneously. Schemes for forming the profile and internal blade surface are given and discussed. Two methods for a variable outlet angle -- by turning the profile and

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ACCESSION NR: AP4045905

by forming the outlet edge through great-radius arcs -- are set forth. The blade is designed on the basis of a specified-stress-vs.-blade-height curve which satisfies the minimum total tensile-stress requirement. The blade is defined by a set of equations which includes certain parameters and the distance of the section in question to the hub end. Orig. art. has: 6 figures and 17 formulas.

ASSOCIATION: Khar'kovskiy turbinny*y zavod im. S. M. Kirova (Khar'kov Turbine Plant)

SUBMITTED: 00 ENCL: 00

SUB CODE: PR . NO REF SOV: 003 OTHER: 000

Card 2/2

L [illegible] EWP(k)/EWP(m)/T-2/EWP(w)/EWP(v) IJP(c) EM

ACC NR: AP6027316 SOURCE CODE: UR/0114/66/000/005/0007/0009

AUTHOR: Sobolev, S. P. (Engineer); Arkad'yev, B. A. (Engineer); Mel'nik, S. M. (Engineer)

52

ORG: none

TITLE: Selection of guiding vane grids

SOURCE: Energomashinostroyeniye, no. 5, 1966, 7-9

TOPIC TAGS: turbine design, turbine blade

ABSTRACT: The article presents a method for optimization of the grid profiles for the guiding vanes of turbines and gives the results of a comparison of three types of profiles. In the comparison of the profiles, no corrections were introduced for the effect of the angle of the incoming flow, or for the Re and M numbers, since in most cases these corrections are not significant. The mean discharge angle for the flow, α, was taken as arcsine a/t, where a is the size of the throat, and t is the spacing of the grid. Based on experimental results, a figure shows the dependence of the profile losses of energy on the relative spacing for three types of profiles. A second figure illustrates the dependence of the total energy losses in the grid on

Card 1/2 UDC: 62-226.001.5

ACC NR: AP6027316

the discharge angle of the flow, α. Orig. art. has: 4 figures and 1 table.

SUB CODE: 13 / SUBM DATE: none/ ORIG REF: 002/ OTH REF: 001

Card 2/2

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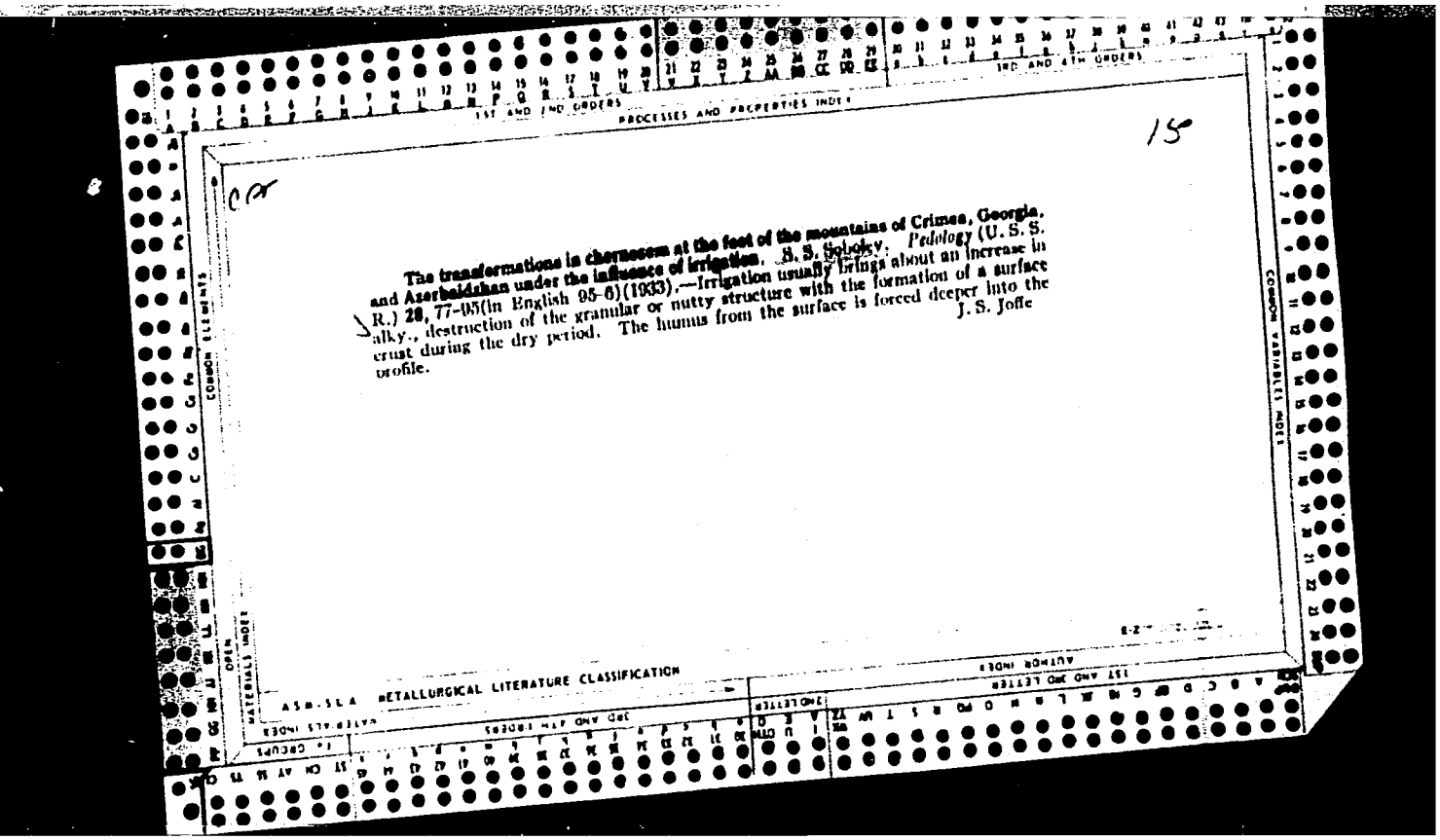

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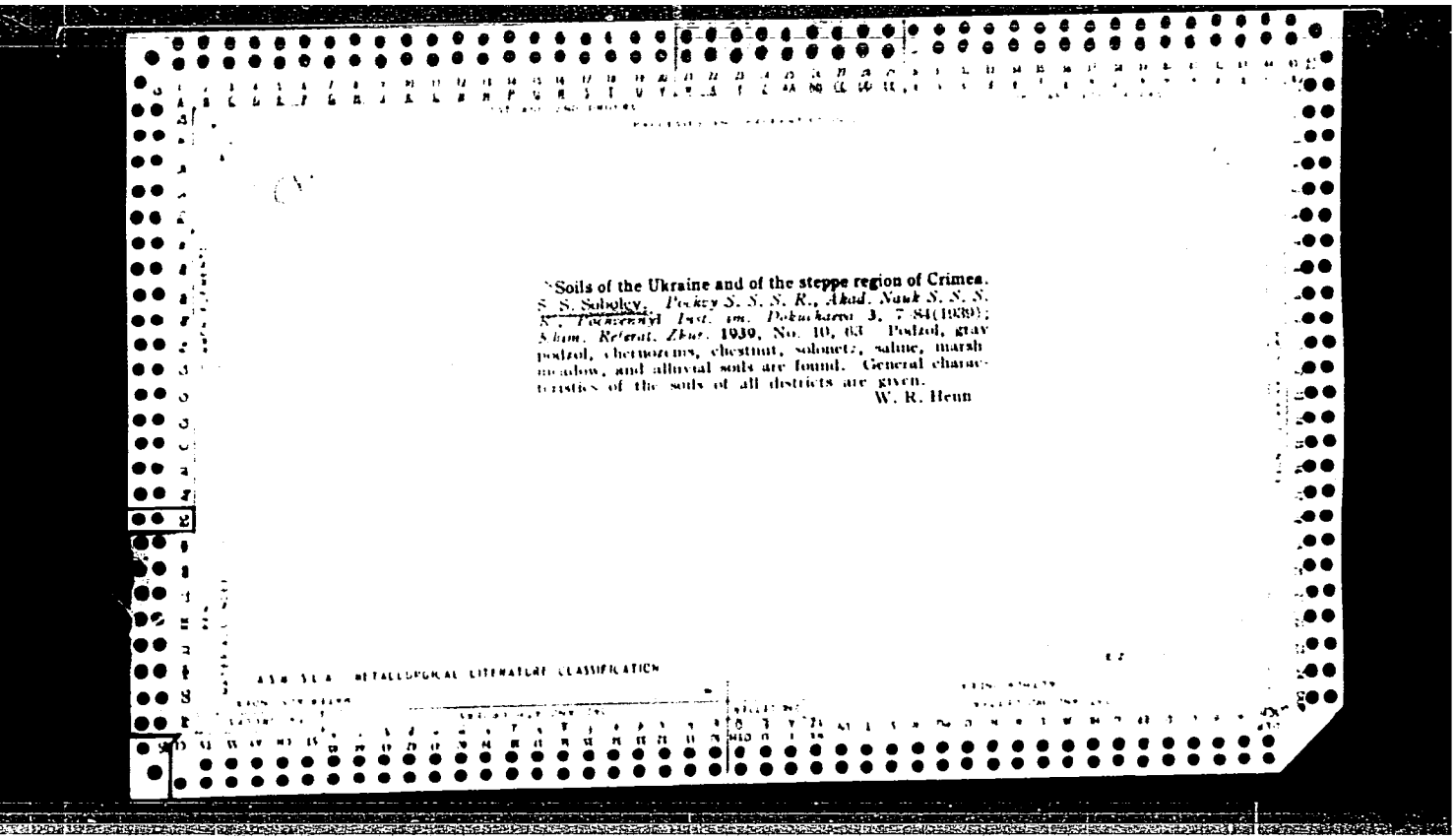
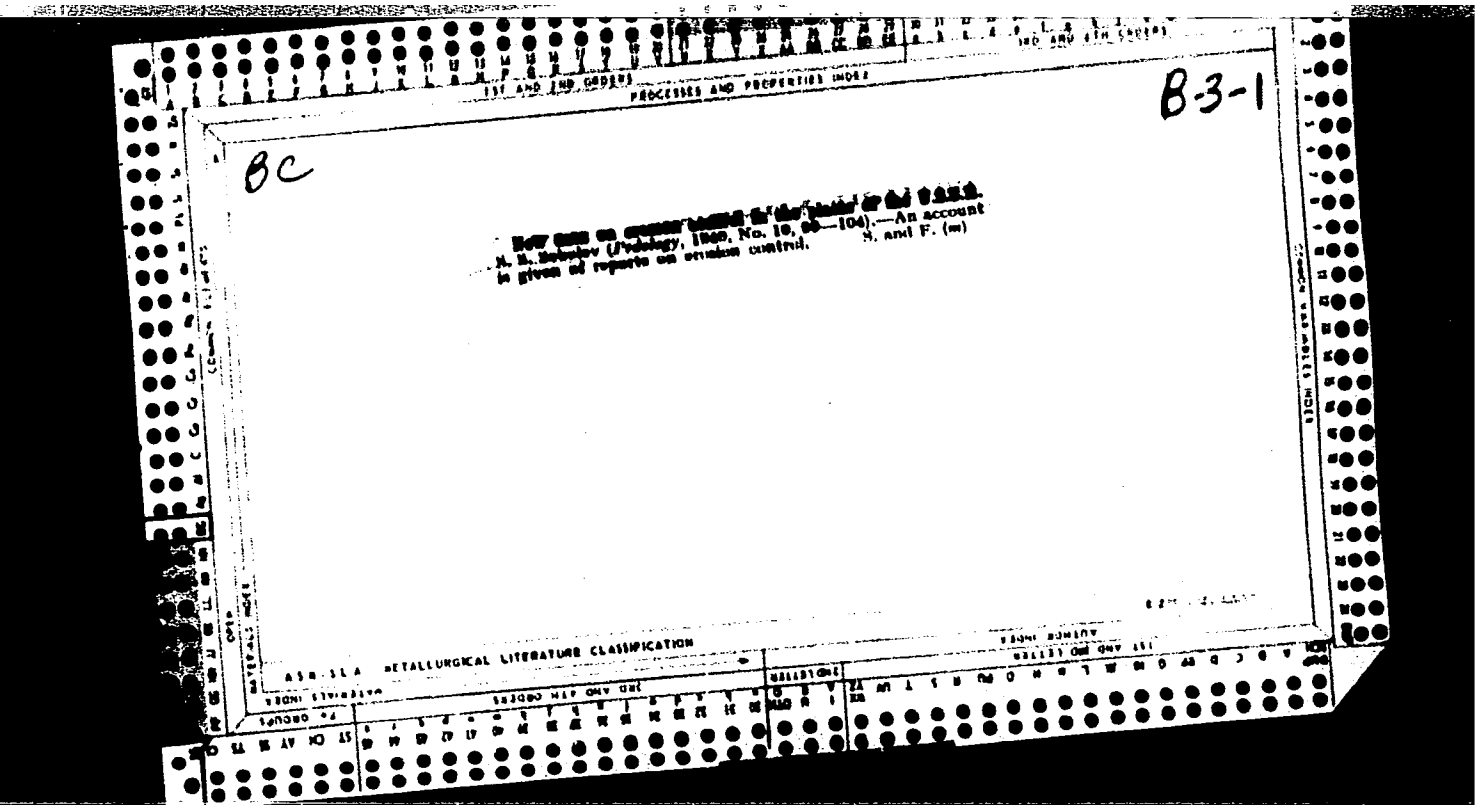
The transformations in chernozem at the foot of the mountains of Crimea, Georgia, and Azerbaidzhan under the influence of irrigation. B. S. Sobolev. *Pedology* (U. S. S. R.) **28**, 77–85 (In English 95–6) (1933).—Irrigation usually brings about an increase in alky., destruction of the granular or nutty structure with the formation of a surface crust during the dry period. The humus from the surface is forced deeper into the profile.

J. S. Joffe



Soils of the Ukraine and of the steppe region of Crimea. S. S. Sobolev. *Pochvy S. S. S. R., Akad. Nauk S. S. S. R., Pochvennyĭ Inst. im. Dokuchaeva* 3, 7-84(1939); *Khim. Referat. Zhur.* 1939, No. 10, 63. Podzol, gray podzol, chernozems, chestnut, solonetz, saline, marsh meadow, and alluvial soils are found. General characteristics of the soils of all districts are given.
W. R. Henn



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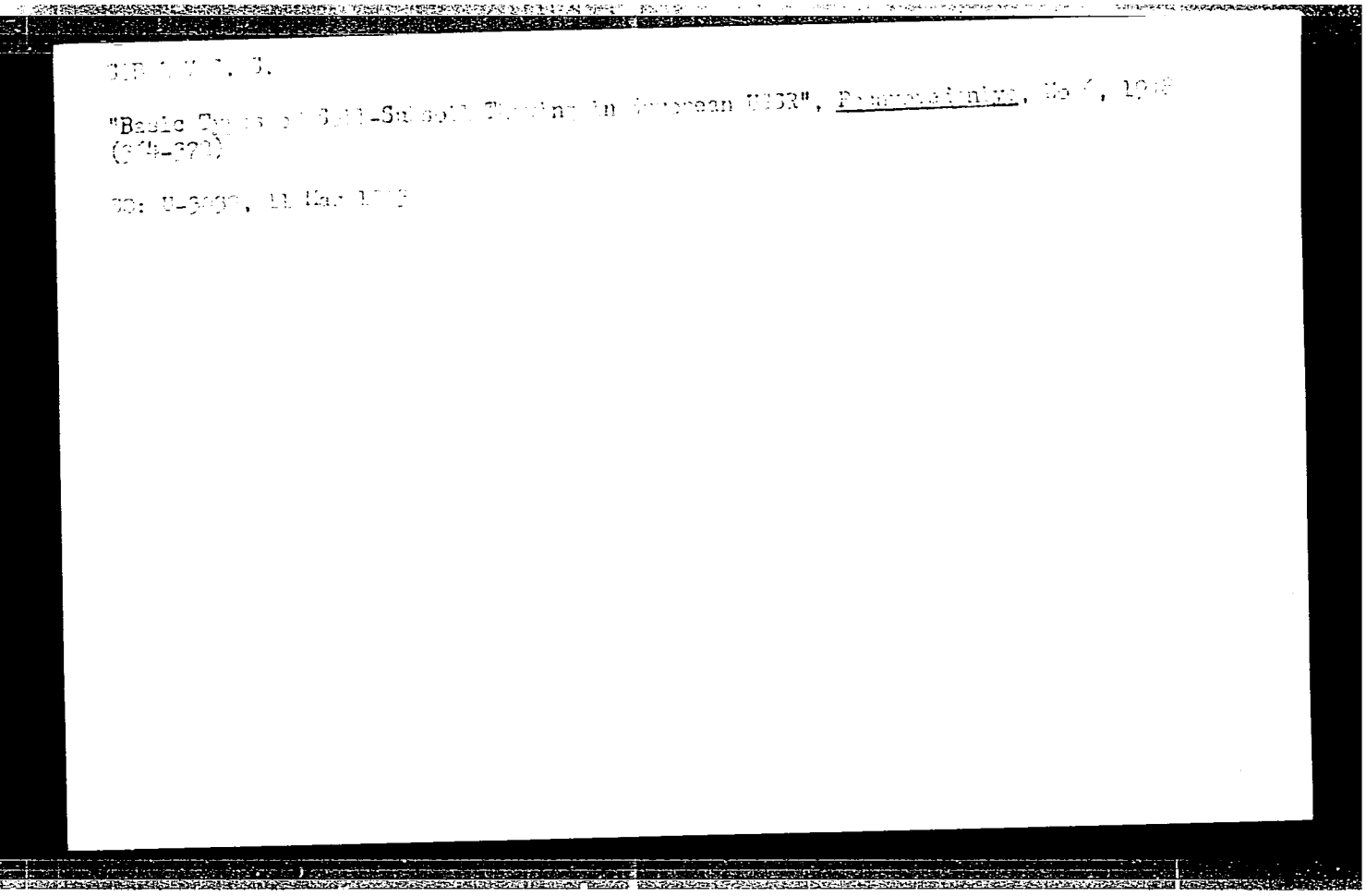

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